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adding a small crystal of nitrate of ammonia to the solution, the reaction becomes more delicate and the formation of the yellow precipitate occurs more rapidly.—Large deposits of mineral manure have been discovered in Russia. The deposits consist of a green sandstone and sand known as *ancella-schicht*. The sandstone consists of fifty per cent of calcium phosphate, twenty-five per cent of glauconite and ten per cent of quartz. The sand has forty per cent of glauconite. The sandstone is cemented by calcium phosphate, and is a most valuable manure.—Dr. Wadsworth has examined a supposed meteorite found at Waterville, Maine, just after the passage of a meteor over the town. The fragment was a cinder-like mass, the surface of which was coated by a fused crust. Although a report like that of a small cannon had been heard at the time the meteor was seen in the sky, suspicion was attached to this stone from the fact that the grass on which it lay was unchanged in appearance. Professor Shepard had analyzed it, but regarded it as doubtful. Examination showed that it was a slag-like body, long exposed to the action of the weather, and containing in its cavities remains of plant fibers. The fluidal structure and the fused matters seen under the microscope, showed that it was merely a slag from some earthenware manufactory, and in no sense a meteorite.—Some curious crystals of fluorite have recently been noticed from Bohemia. The crystals were combinations of cube, hexoctahedron and octahedron, remarkable for certain rectangular markings on the cubic faces. It has been shown that these markings are due to a double growth of the crystal whereby a simple crystal was first formed, afterward to be enclosed in a more complex crystal which was built up around the first. It is thus an enclosure of fluorite in fluorite.—Professor J. S. Newberry has contributed interesting articles on the formation of coal and the origin of carbonaceous matter in bituminous shales. He describes a number of facts regarding the bituminous coal fields of the Mississippi valley which clearly show that the “peat bog theory” gives the true explanation of the origin of that great deposit, as opposed to an “estuary or raft theory” now advocated by some geologists. He holds that the carbonaceous matter in bituminous shales is due to the presence of algæ, which thus are the primary source of petroleum and mineral gas.

BOTANY.¹

THE GROWTH OF PLANTS IN ACID SOLUTIONS. II.—Before the plants could be analytically examined they became disarranged and some identifications lost. The following items are interesting :

The hydrochloric acid plant was examined for chlorine, the

¹ Edited by PROF. C. E. BESSEY, Ames, Iowa.

whole plant being divided into three parts. The top, embracing leaves and portion of stem, contained .205 grains of chlorine; the middle or stem to within a few millimeters of the first roots, .1373 grains of chlorine; the roots, .102 grains of chlorine. The sum of these amounts gave 3.54 per cent of chlorine in the entire plant. The hydrochloric acid formed soluble chlorides which were taken up by the plant. The percentage of chlorine in plants, excluding strand or beach plants, seldom exceeds one per cent.

The parts of another plant similarly divided into top, middle and roots, gave, upon maceration in warm water, an alkaline reaction which when titrated with acid, yielded the following results: the titration of the top converted into decinormal alkali equaled .294 grains carbonate soda; the middle gave .0432 grains, and the roots .049 grains carbonate of soda, or considering the alkali as soda, 1.3 per cent of soda for the whole plant, a fairly average percentage for plants of this description.

The percentage of ash of the other plants was determined in order to observe if the use of acid waters had increased the mineral matter of the plant through its solvent action upon inorganic ingredients of the soil. This examination gave the following results:

	<i>Wt. dried plant.</i>	<i>Percentage ash.</i>
Water plant.....	1.1615 grammes.	19.11
Carbolic acid plant.....	.5135 "	16.60
Nitric " " .....	.536 "	16.79
Formic " " .....	.5535 "	18.15
Salicylic " " .....	.5885 "	17.00
Tannic " " .....	.6975 "	19.80
Tartaric " " .....	.9325 "	14.74

Considering the devitalized condition of the acid plants mentioned above and the decreased weights of the others in this table below that of the water plant, it is evident that the acid waters tend to introduce inorganic ingredients into the tissue of the plants.

During the last winter I have kept hyacinth bulbs in acid waters identical with those used upon the geranium plants, adding to them oxalic acid. The effect upon the plants was deleterious and destructive. The water plant flowered upon March 7th, having numerous roots, a tall flower stalk and leaves six inches long. The hydrochloric acid bulb died, as did the sulphuric acid subject, though one month later. No roots appeared upon any acid bulb except a few in the tannic acid solution. The plants were low, the flowers appeared without scapes, and the leaves attained under these adverse circumstances, at the best, a height of three inches.

On March 31st the tannic acid bulb flowered and the flowers were a dark purple, much deeper in color than those of the water plant. The bulbs were supposed to be one variety, having all one

color. On April 1st the tartaric acid plant flowered, the flowers just emerging from the bulb. The citric acid plant flowered at the same time. The oxalic acid plant flourished better than the rest except that in tannic acid. On April 29th the nitric acid bulb pushed open a few pale flowers and died. This summer geranium plants will be watered with acid solutions, and grown upon siliceous, calcareous and feldspathic soils.—*L. P. Gratacap, 77th street and 8th avenue, New York city.*

REVISION OF THE NORTH AMERICAN TRIFOLII.—Lojacono, in the April number of *Nuovo Giornale Botanico Italiano*, attempts a revision of the North American Trifolii. The genus is divided into seven sections, under which the species are arranged as follows. The principal synonyms being given in parentheses :

Section I. AMORIA.

1. *T. bifidum* Gray, California. 2. *T. breweri* Watson, California. 3. *T. amabile* H. B. & K., California and Mexico. 4. *T. hemsleyi* Loja. (*T. amabile* of American authors), Mexico. 5. *T. potosanum* Loja., Mexico. 6. *T. goniocarpum* Loja., Mexico. 7. *T. ciliatum* Nutt., Western North America. 8. *T. gracilentum* Torr. & Gr., California. 9. *T. palmeri* Watson, Guadaloupe island. 10. *T. amphianthum* Torr. & Gr., Texas and Louisiana. 11. *T. reflexum* Linn., Canada to Florida and Texas. 12. *T. stoloniferum* Muhl., Ky., Ohio to Missouri. 13. *T. carolinianum* Michx., the Carolinas to Florida, Arkansas and Texas. 14. *T. bejariense* Moric. (*T. macrocalyx* Hook.), Texas.

Section II. LUPINASTER.

15. *T. parryi* Gray, Colorado. 16. *T. beckwithii* Brewer, California and Idaho. 17. *T. longipes* Nutt., Oregon and Rocky Mts. 18. *T. plumosum* Dougl., Oregon. 19. *T. gymnocarpum* Nutt., Rocky Mts. 20. *T. megacephalum* Nutt., California to Washington Territory and Utah. 21. *T. lemmonii* Watson, California. (By a curious error the second *m* of the specific name is changed to *n*, as it is also wherever Mr. Lemmon's name occurs, the latter always appearing as Lemmon!) 22. *T. plummeri* Lemmon, Pyramid lake. 23. *T. bolanderi* Gray, California. 24. *T. kingii* Watson, California and Utah. 25. *T. eriocephalum* Nutt., Oregon. 26. *T. altissimum* Dougl., Oregon and Idaho. 27. *T. andinum* Nutt., Rocky Mts. 28. *T. dasyphyllum* Torr. & Gr., Rocky Mts. 29. *T. brandegei* Watson, New Mexico to California. 30. *T. nanum* Torr., Colorado and Utah. 31. *T. andersonii* Gray, California, Nevada and Utah.

Section III. PHYLOSEMIUM.

32. *T. fuscatum* Lindl., California. 33. *T. amplexans* Torr. & Gr., California and Guadaloupe island. 34. *T. depauperatum* Desv., California (also in Peru and Chili).

Section IV. INVOLUCRARIUM.

35. *T. spinulosum* Dougl., California. 36. *T. involucratum* Willd., California. 37. *T. heterodon* Nutt., California. 38. *T. nuttallii* Steud. (*T. polyphyllum* Nutt.), California. 39. *T. monanthum* Gray, California. 40. *T. appendiculatum* Loja., (*T. obtusiflorum* Hook.), California. 41. *T. variegatum* Nutt., California. 42. *T. pauciflorum* Nutt., California. 43. *T. aciculare* Nutt., California. 44. *T. tridentatum* Lindl., California. 45. *T. watsonii* Loja., California. This is one of the many forms which have been hitherto considered varieties of *T. tridentatum*.

Section V. CYATHIFERUM.

46. *T. cyathiferum* Lind., Oregon and Rocky Mts. 47. *T. barbigerum* Torr., California. 48. *T. grayi* Loja. (*T. barbigerum*, var. *andrewsii* Kellogg), California.

Section VI. MICRANTHOIDEA.

49. *T. microdon* Hook., California and Oregon. 50. *T. circumdatum* Kunze

(not certainly known as North American). 51. *T. microcephalum* Pursh, Oregon and California.

Section VII. EULAGOPUS.

52. *T. macraei* Hook. (*T. albopurpureum* Torr. & Gr.), Western North America.
53. *T. neolagopus* Loja. (hitherto included under the preceding species), California.

The introduced species, which are often subspontaneous, are given by Lojacono as follows: *T. agrarium* Linn., *T. arvense* Linn., *T. medium* Linn., *T. patens* Schreb., *T. pratense* Linn., *T. procumbens* Schreb., *T. repens* Linn. It will be remembered that Dr. Gray says of the last in his Manual, "Here probably introduced, but indigenous northward."

LARGE FUNGI.—Last summer my attention was called to a large fungus growing on the trunk of an old "gum tree" (*Nyssa multiflora*) in the swamp near my house. On going to the place I saw, on the trunk of the tree, which was old and in places partially decayed, about twelve feet from the ground, a large, hemispherical, light colored protuberance which was evidently a fungus of some sort, but being above my reach I could not tell just what it was. I tried to loosen it with a pole, but it adhered so firmly to the trunk that this could not be accomplished. I therefore procured a short ladder, with the aid of which and a long-bladed knife, I cut away the specimen. It proved to be *Hydnum septentrionale* Fr., measuring one foot across, and weighing ten pounds. The mass consisted of about six horizontal layers, one above another, an inch or more thick, entirely free and separate from each other, except that they all proceeded from the same fleshy layer, which was firmly attached to the wood from which the fungus grew. The teeth which cover the lower surface of the horizontal layers are cylindrical, awl-shaped processes half an inch long or more, their extremities at first truncate with an imperfect fringe of short hairs, but the tips at length become acute. The whole is of a dull yellowish-white color and of a tough, fibrous, fleshy texture. The specimen described in N. Am. Fungi, which was found at West Chester, Pa., by Messrs. Everhart, Haines, Jefferies and Gray, grew in a similar situation, on the trunk of a beech tree, just out of reach. Mr. D. L. James, of Cincinnati, Ohio, also mentioned that the specimens of *Trametes graveolens*, which are found there on beech trees, usually grow just out of reach on the standing trunks. On the other hand, of the numerous specimens of *Polyporus obtusus* (N. A. F., 389) growing on partly dead trunks of oak trees about Newfield, I have never seen but a single specimen that I could not readily reach standing on the ground. *Trametes pini* also is generally found near the ground, though occasionally a specimen is found fifteen or twenty feet from the ground growing from some dead place in the standing trunk.

It may be remarked that as a rule the large Polypori and Hydnums that grow on standing trunks, are found not far from the

ground, probably on account of the more abundant moisture which rises to a certain distance, even in the dead trunk, through capillary force.—*J. B. Ellis, Newfield, N. J.*

REVISION OF THE GENUS CLEMATIS OF THE UNITED STATES.—Joseph F. James has just published a revision of the genus *Clematis* of the United States in the *Journal of the Cincinnati Society of Natural History* (Vol. vi, July, 1883), the general conclusions of which are embodied in the following table:

Section I. ATRAGENE.

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|---|---|--|
| 1. <i>C. verticillaris</i> DC. | = | { <i>Atragene americana</i> Sims., <i>A. columbiana</i> Nutt., <i>Clematis americana</i> Poir., <i>C. columbiana</i> T. & G. |
| 2. <i>C. alpina</i> Mill.,
var. <i>ochotensis</i> Gray | = | { <i>Atragene alpina</i> Torr.
<i>A. ochotensis</i> Pall. |

Section II. CLEMATIS.

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|--|---|---|
| 3. <i>C. baldwinii</i> Torr. & Gr. | | |
| 4. <i>C. douglasii</i> Hooker | = | <i>C. wyethii</i> Nutt. |
| 5. <i>C. scottii</i> Porter | | |
| 6. <i>C. ochroleuca</i> Aiton,
var. <i>fremontii</i> James | = | <i>C. ovata</i> Pursh, <i>C. sericea</i> Michx.
<i>C. fremontii</i> Watson. |
| 7. <i>C. viorna</i> L.,
var. <i>coccinea</i> James
var. <i>pitcheri</i> James | = | <i>Viorna urnigera</i> Spach.
<i>C. coccinea</i> Engelm., <i>C. texensis</i> Buckl.
<i>C. pitcheri</i> Torr. & Gr., <i>C. filifera</i> , Benth. |
| 8. <i>C. bigelovii</i> Torr. | | |
| 9. <i>C. reticulata</i> Walter | | |
| 10. <i>C. crispa</i> L. | = | { <i>C. cordata</i> Sims., <i>C. cylindrica</i> Sims., <i>C. cylindrica</i> , var. <i>crispa</i> Wood, <i>C. divaricata</i> , Jacq., <i>C. simsii</i> Sweet, <i>C. viorna</i> Andr., <i>Viticella crispa</i> Spach., <i>Clematitis crispa</i> Moench, <i>Viorna cylindrica</i> Spach. |
| var. <i>walteri</i> Gray | = | { <i>C. cylindrica</i> , var. <i>lineariloba</i> , Wood.
<i>C. cylindrica</i> , var. <i>walteri</i> Wood.
<i>C. lineariloba</i> DC., <i>C. walteri</i> Pursh. |
| 11. <i>C. lasiantha</i> Nutt | | |
| 12. <i>C. pauciflora</i> Nutt | | |
| 13. <i>C. drummondii</i> Torr. & Gr. | = | <i>C. nervata</i> Benth. |
| 14. <i>C. virginiana</i> L. | = | { <i>C. cordata</i> Pursh, <i>C. cordifolia</i> Moench, <i>C. catesbyana</i> , Pursh, <i>C. fragrans</i> Salisb., <i>C. pennsylvanica</i> Donn, <i>C. purshii</i> Dietr. |
| var. <i>bracteata</i> DC. | = | <i>C. bracteata</i> Moench, <i>C. holosericea</i> Pursh. |
| 15. <i>C. ligusticifolia</i> Nutt.
var. <i>brevifolia</i> Nutt.
var. <i>bracteata</i> Torr | = | <i>C. virginiana</i> Hook. (in part, not Linn.)
<i>C. virginiana</i> Hook. (in part, not Linn.) |
| var. <i>californica</i> Watson | = | { <i>C. ligusticifolia</i> Dur. & Hill (not Nutt.), <i>C. ligusticifolia</i> , var. <i>brevifolia</i> Benth. (not Nutt.) |

THE BOTANICAL CLUB OF THE A. A. A. S.—There was such a gratifying attendance of botanists at the Minneapolis meeting of the American Association for the Advancement of Science that a meeting was called on Thursday afternoon, Aug. 16th. Twenty-five members, who are more or less interested in botanical studies, responded to the call. An informal organization was effected, and several committees were appointed. Several excursions were provided for, and arrangements were made for calling the club

together, from time to time, for the reading and discussion of papers, the exchange of notes, etc., while no small part of the profit of the organization of the club was found in the social enjoyment which it provided.

Dr. Beal, of Lansing, was made chairman, and Professor Coulter, editor of the *Botanical Gazette*, secretary. These officers are empowered to call a meeting of the club at Philadelphia next year. J. M. Coulter, of Crawfordsville, Ind., W. G. Farrow, of Cambridge, Mass., and C. E. Bessey, of Ames, Iowa, were appointed a committee to prepare a proper memorial to the Post-Office Department at Washington upon the postal regulations as to the transmission of botanical specimens through the mails. The committee invite correspondence upon this matter from botanists who have been annoyed by postal regulations.

PROFESSOR P. A. SACCARDO'S SYLLOGE FUNGORUM OMNIUM HUCUSQUE COGNITORUM.—The second volume of this work is now issued. It contains 813 pages besides 69 pages of addenda, carrying the number of species up to 6180, which is supposed to include all the Pyrenomycetes thus far known. At the end of this volume is an alphabetical index of all the specific names in the two volumes, the generic name being added in parenthesis after each specific name.

Whatever may be thought of the many new genera into which the old genus *Sphæria* is here divided, there can be but one opinion as to the practical value of the work, which should be in the hands of every student of mycology. The third volume, embracing the lower orders of fungi, *i. e.*, Sphærospideæ, Melanconieæ and Hyphomycetææ, will be ready some time in 1884.—*J. B. Ellis, Newfield, N. Y.*

BENTHAM AND HOOKER'S GENERA PLANTARUM.—Every botanist will rejoice that at last this great work has been completed, thus giving us a manual of the genera and orders of Phanerogamia. Volume I bears the dates of 1862 and 1867 for Parts I and II respectively; for Vol. II the dates are 1873 and 1876, while for Vol. III they are 1880 and 1883. The work has thus been under way for more than twenty years.

Part II of Vol. III, which completes the work, was received by botanists in this country about the first of June of this year. It is devoted entirely to the Monocotyledons, and will be interesting as furnishing, for the first time in many years, a definite arrangement of these plants. Seven "series," apparently about equivalent to the "cohorts" of Vols. I and II, include the thirty-four orders. These, with the orders they include, are as follows:

Series I. MICROSPERMÆ.—Hydrocharideæ, Burmanniaceæ, Orchideæ, the latter including Apostasiaceæ.

Series II. EPIGYNÆ.—Scitamineæ, Bromeliaceæ, Hæmodoraceæ, Irideæ, Amaryllideæ, Taccaceæ, Dioscoreaceæ.

Series III. CORONARIÆ.—Roxburghiaceæ, Liliaceæ (which includes all the many tribes and suborders—Smiliaceæ, Melanthaceæ, Trilliaceæ, etc.—which have often been regarded as distinct orders), Pontederiaceæ, Philodracæ, Xyridæ, Mayaceæ, Commelinaceæ, Rapateaceæ.

Series IV. CALYCINÆ.—Flagellariæ, Juncaceæ, Palmæ (including Phytelphasieæ and Nipaceæ).

Series V. NUDIFLORÆ. — Pandanæ, Cyclanthaceæ, Typhaceæ, Aroideæ, Lemnaceæ.

Series VI. APOCARPÆ.—Triurideæ, Alismaceæ, Naiadaceæ (including Juncagineæ).

Series VII. GLUMACÆ.—Eriocaulæ, Centrolepideæ, Restiaceæ, Cyperaceæ, Gramineæ.

With this volume we may now arrange the Monocotyledons in our herbaria with something like satisfaction, which before was impossible. The disposition of the genera in many orders, as for example in the Gramineæ, being very different from that heretofore followed, will necessitate some quite radical and at first confusing changes, but from our experience with the grasses under the new arrangement, we are confident that it will prove much more satisfactory than the old.—*C. E. Bessey.*

BOTANICAL NOTES.—At the meeting of the American Association for the Advancement of Science at Minneapolis, fifteen papers upon botanical subjects were presented, a larger number than for many years. The substance of some of these may be summarized as follows: Dr. E. L. Sturtevant pointed out an interesting parallelism between the structure of the kernels of maize and sorghum. In maize that structure has generally been regarded as the result of careful selection by man, but in sorghum, where we have exactly parallel structure, that explanation is untenable.—Professor D. P. Penhallow, by careful measurements, determined the root and leaf areas to be approximately equal in the case of maize.—The box-huckleberry (*Vaccinium brachycerum* Michx., *Gaylussacia brachycera* Gray) was shown by Professor E. W. Claypole to be a species in the process of extinction. A small patch of a few acres in Perry county, Pa., and another in Delaware are singularly isolated.—Dr. Sturtevant presented his plans for an agricultural botany, showing that there are forms of cultivated plants which admit of as accurate definition and classification as the uncultivated ones.—Professor W. R. Dudley, from a study of the flora of Central New York, considers that it originated in the West and Northwest, that is, in what may be called the Central and Upper Mississippi valley.—*Sabbatia angularis* has been observed by Miss M. E. Murdfeldt to appear in one locality in Missouri at intervals of seven years. It will be interesting to know whether a similar periodicity has been noticed for this plant elsewhere.—The development of the dandelion flower has been made a special study by Professor J. M. Coulter during the present year. His paper will soon appear in full.—Dr. W. J. Beal brought forward numerous cases in the Gramineæ in which the lower sheaths of the leaves are *closed* as in sedges, instead of being *open* as is almost invariably stated in

descriptions.—J. C. Arthur described a minute fresh-water seaweed (*Rivularia fluitans*) abounding in the lakes of Minnesota, and which has this year again apparently been poisonous to cattle.—J. F. James argued that from structural and other characters the Compositæ should stand at the head of the vegetable kingdom.—At the meeting of the Society for the Promotion of Agricultural Science at Minneapolis, August 14th, Dr. W. G. Farlow presented a complete revision of the North American Peronosporæ. The number of species has been greatly increased since his last revision in the Bulletin of the Bussey Institution in 1876.

ENTOMOLOGY.¹

ENTOMOLOGY AT MINNEAPOLIS.—Owing to the fact that there were no active members and but two honorary members of the Cambridge Entomological Club present at Minneapolis on the 14th of August, the meeting of said club announced for that day at 2 p. m. did not take place. On the next day, however, in obedience to a call made by Mr. J. A. Lintner, who was instructed at Montreal to fix a day of meeting, the entomologists of the association assembled and effected a temporary organization, before which Professor S. A. Forbes read a letter from Mr. Lintner expressing regrets at his inability to be present. The prevailing feeling at Montreal was explained by Mr. C. V. Riley, on whose motion the old Entomological Club of the A. A. A. S. was revived by the election of Dr. D. S. Kellicott, of Buffalo, N. Y., as president, Professor Herbert Osborn, of Ames, Ia., as vice-president, and Prof. O. S. Westcott, of Maywood, Ills., as secretary.

The old rules were adopted with the modification that instead of any member of the association interested in entomology being *ipse facto* a member of the club, registration is made a requisite of membership.

Three meetings were held, and the attendance comprised among others the following persons specially interested in entomology: D. S. Kellicott, P. R. Hoy, O. S. Westcott, Jenny Hoy, S. A. Forbes, G. H. Perkins, Mary E. Murtfeldt, E. S. Morse, Julius Pohlman, E. W. Claypole, Lillie J. Martin, Herbert Osborn, R. J. Mendenhall, Thos. S. Roberts, Wm. Saunders, C. E. Bessey, E. H. Canfield, Jno. Hicks, C. L. Herrick and C. V. Riley.

We give a brief account of the subjects presented and discussed, and shall in due time give abstracts of the papers of an entomological character read in Section F of the association.

Life-histories of Butterflies.—Mr. Wm. H. Edwards, of Coalburgh, W. Va., sent in the following recent experience in rearing *Rhopalocera*:

"I have *Colias barbara* larva past fourth molt, .65 in. long.

¹ This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.